

REMARKS

The specification has been amended to include subheadings and correct a typographical error which it is believed will be readily understood by one skilled in the art reading the specification. More specifically, the specification has been amended to show that the ligand L is σ -bonded to the silicon. This is exemplified by the preferred compounds, bis(indenyl) dichlorosilanes disclosed on page 3, line 22 of the specification. A similar amendment has also been made to claims 1 and 6. Claims 1 and 6 have also been amended to make it clear that the alternate siloxane is a halogenated siloxane. See page 3, line 26 of the specification.

The specification has also been amended to delete reference to Figures 1 and 2 which were not included in the application as filed. Also enclosed is an Abstract on a separate sheet of paper as required by M.P.E.P. §608.01(b).

Applicants' invention, as set forth in claim 1 relates to a process for the preparation of a silicon containing transition metal catalyst compound, said process comprising the steps of

(a) non-hydrolytic sol-gel condensation of a silane of formula



wherein

L is a σ -bonded ligand,

Q is an anionic ligand, and

$$x + n = 4$$

with a halogenated silane or a halogenated siloxane and an alkoxysilane,

(b) optionally alkylation,

(c) deprotonation, and

(d) addition of a transition metal compound.

Claim 6 is similar, but includes alkylation, deletes deprotonation and restricts the transition metal compound to a transition metal amine.

In the Office Action, the Examiner rejected claims 1-13 under 35 U.S.C. §103(a) for being obvious over the Santos et al. article [Polymer, Vol. 42, pp. 4517-4525 (2001), hereafter Santos I in view of EP 0 312 160 to Roggero et al., hereafter EP'160. The same claims were also rejected over the Santos et al. article [Applied catalysis A: General Vol. 220, pp. 287-302 (2001), hereafter Santos II in view of EP'160. While Santos I and II were cited by applicants and by the Examiner, it is noted that EP 0 312 160 was not included in the Form PTO-892. It would be appreciated if the Examiner would include the reference in a Form PTO-892 in the next communication.

On the other hand, it is noted that the Examiner does not discuss EP'160 or its relation to the Santos I and II articles, but discusses a reference to Hay et al., hereafter Hay. Moreover, EP'160 relates to solid polymeric electrolytes. Did the Examiner perhaps mean the rejections were based on Santos I or Santos II in view of Hay? If so, correction of the grounds for rejection would be appreciated.

The process described in Santos I comprises a hydrolysis and condensation between $\text{Si}(\text{OEt})_4$ and $(\text{EtO})_2\text{Si}(\text{Ind})_2$. Claim 1 of the present invention requires that three catalyst components, a silane, a halogenated silane or a halogenated siloxane and an alkoxysilane are reacted together in non-hydrolytic sol-gel condensation which may inherently take place in the presence of a condensation catalyst such as zirconium tetrachloride (see example 1).

The process of Santos is, therefore, quite different as it is a hydrolytic condensation between only two of the components — the silane and the alkoxy silane. In addition, there is no halogenated silane or halogenated siloxane present in Santos.

The Examiner acknowledges that Santos is a hydrolytic procedure and different to that required by claim 1 and cites Hay at page 1811 as describing a non-aqueous route involving the reaction between halogenated silanes and alkoxy silanes in the presence of a catalyst such as iron (III) chloride.

Hay describes non-hydrolytic sol-gel (NHSG) procedures for the reaction between a metal halide and an oxygen donor (e.g. an alkoxide). Hay is silent with respect to the addition of a transition metal compound to prepare a polymerization catalyst system. There is no teaching or suggestion in Hay of the use of the processes described therein for use in the preparation of such catalysts. In addition, Hay acknowledges that the non-hydrolytic route described therein is different to the hydrolytic route (for example as described in Santos). At page 3396 (left hand column at the bottom) Hay states when discussing the chemistry that “one important consequence of this is that reactivity differences between different metals such as silicon and transition metals may not be the same as those observed in the hydrolytic reaction.” The differences are also explored in Hay in the Table on page 3402 showing at least 5/6 differences including the fact that the NHSG procedure has the potential problem of O-containing species.

Therefore, one skilled in the art reading Hay would not be sure of the effect of replacing the hydrolytic route with the non-hydrolytic route, especially with a three

component contact, as required by the present invention, instead of the two component contact required by both Hay and Santos I.

Accordingly, in the absence of the benefit of reading applicants' specification, there would have been no suggestion to the man skilled in the art to combine the teachings of Hay with Santos I. Claims 1-13 should, therefore, not be considered obvious over this combination of references, if that is the rejection the Examiner intended to make, and its withdrawal as a ground of rejection of the claims is, therefore, requested.

Santos II relates to indenyl-silica xerogels as new materials for supporting metallocene catalysts and is discussed on page 2, lines 26-28 of the specification. Here, the indenyl-silica xerogels are prepared by hydrolysis and polycondensation of bis(indenyl) diethoxysilanes and tetraethoxysilane (see abstract and examples in Santos II).

Hydrolysis has to be given its accepted meaning both in the reference and in the present application as a "chemical reaction of a substance with water."

In the examples of Santos II on page 289 it is clear that the reaction between the bis(indenyl) diethoxysilane and tetraethoxysilane (TEOS) is a co-hydrolysis in the presence of water. In the present invention bis(indenyl) dichlorosilane undergoes a non-hydrolytic reaction with a halogenated silane (dimethyldichlorosilane) and TEOS.

Hence the process in Santos is quite different to that of the present invention and again requires a hydrolytic route. The same comments apply as applied to Santos I. Even though Santos II teaches the other steps required by claim 1, deprotonation and

treatment with a transition metal compound to provide a polymerization catalyst, the reference stills suffers from the same deficiencies noted above.

The Examiner has again repeated the argument that the disclosure of Hays provides the skilled expert with the motivation to use the non-hydrolytic sol-gel procedure in the preparative route of Santos II. However, this is not correct for the same reasons expressed above with respect to Santos I.

Withdrawal of the rejection of the claims over Santos II in view of Hay is, therefore, also requested.

It is believed claims 1-13 are in condition for allowance.


In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Attachments: New Abstract

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